

Digitizing and Tokenizing the Bamboo Supply Chain using Blockchain – A Pilot Project

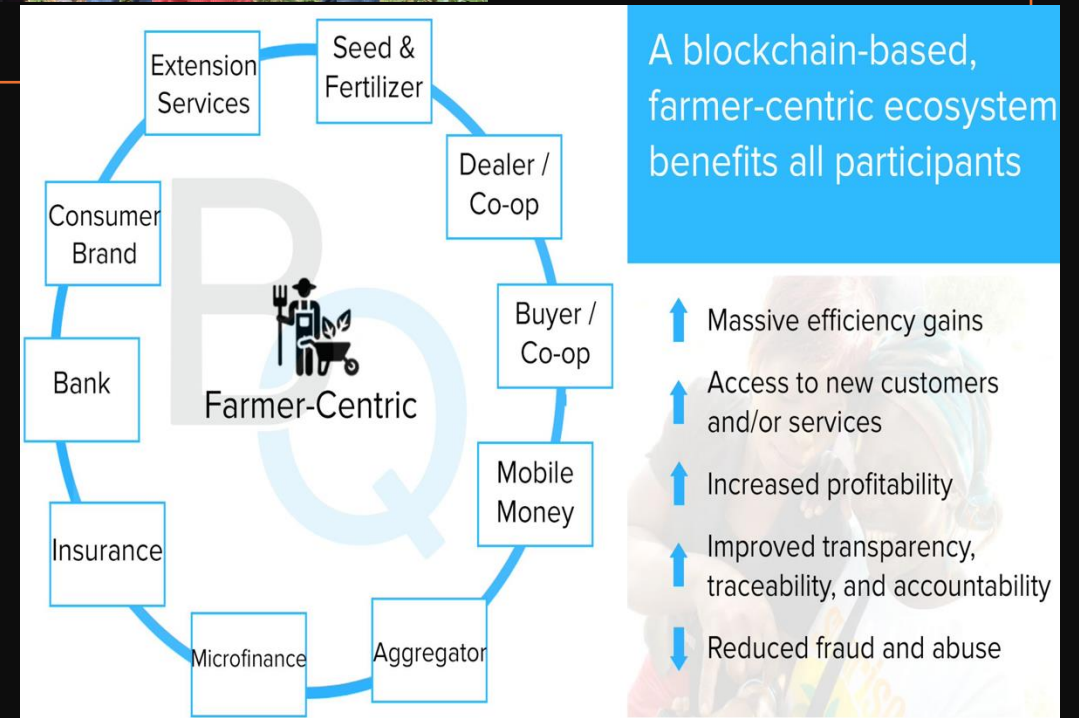
Enabling and strengthening smallholder and enterprise value chains in the Philippines through dMRV (digital monitoring reporting verification)

Supported by ADB TA 10470: *Harnessing Bamboo Industries for Green Growth and Climate Action* in collaboration with the Rizome corporation, Rep. Jose Manuel Alba (1st district, Bukidnon), Rep. Anna Veloso-Tuason (3rd district, Leyte), and the Philippine Bamboo Industry Development Council (PBIDC)

Introduce *Farmer360*

Digital value chain platform with
dMRV (digital monitoring reporting
verification)

To increase farmers' incomes,
enhance efficiency and productivity of
enterprises, and scale up
stakeholders' participation in the
bamboo value chain

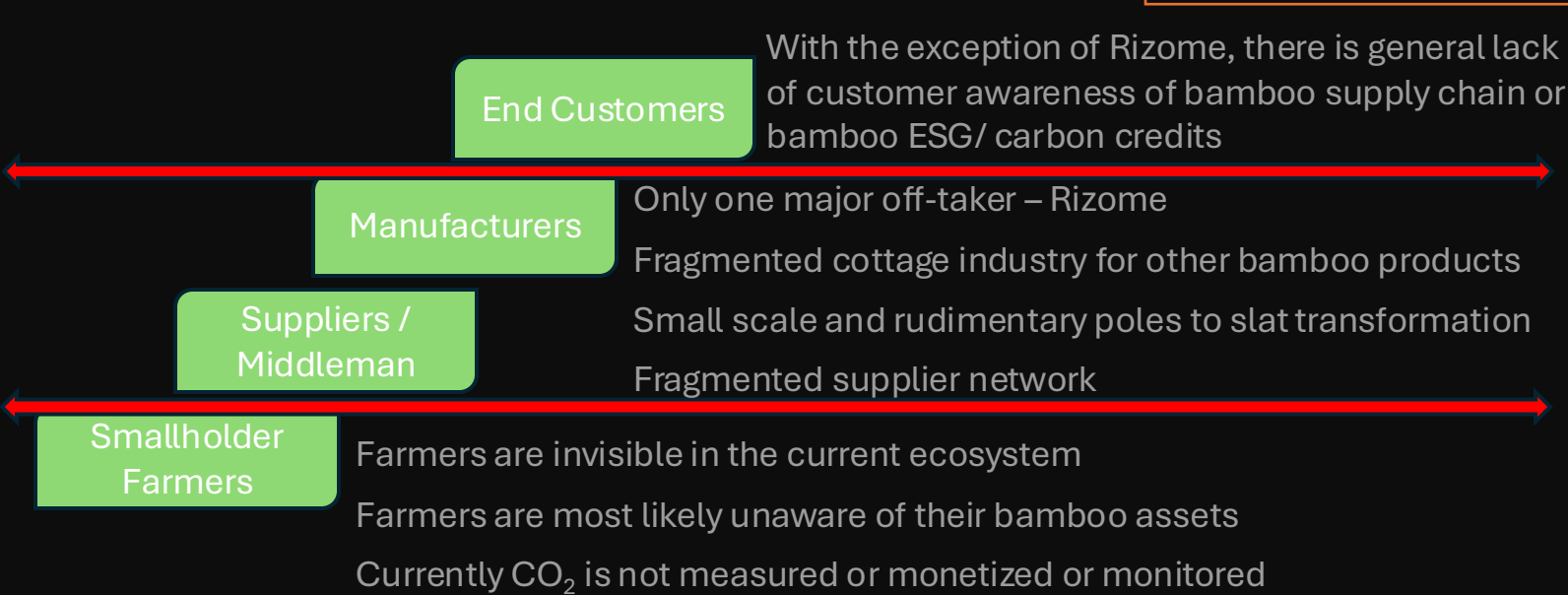




Why Blockchain?

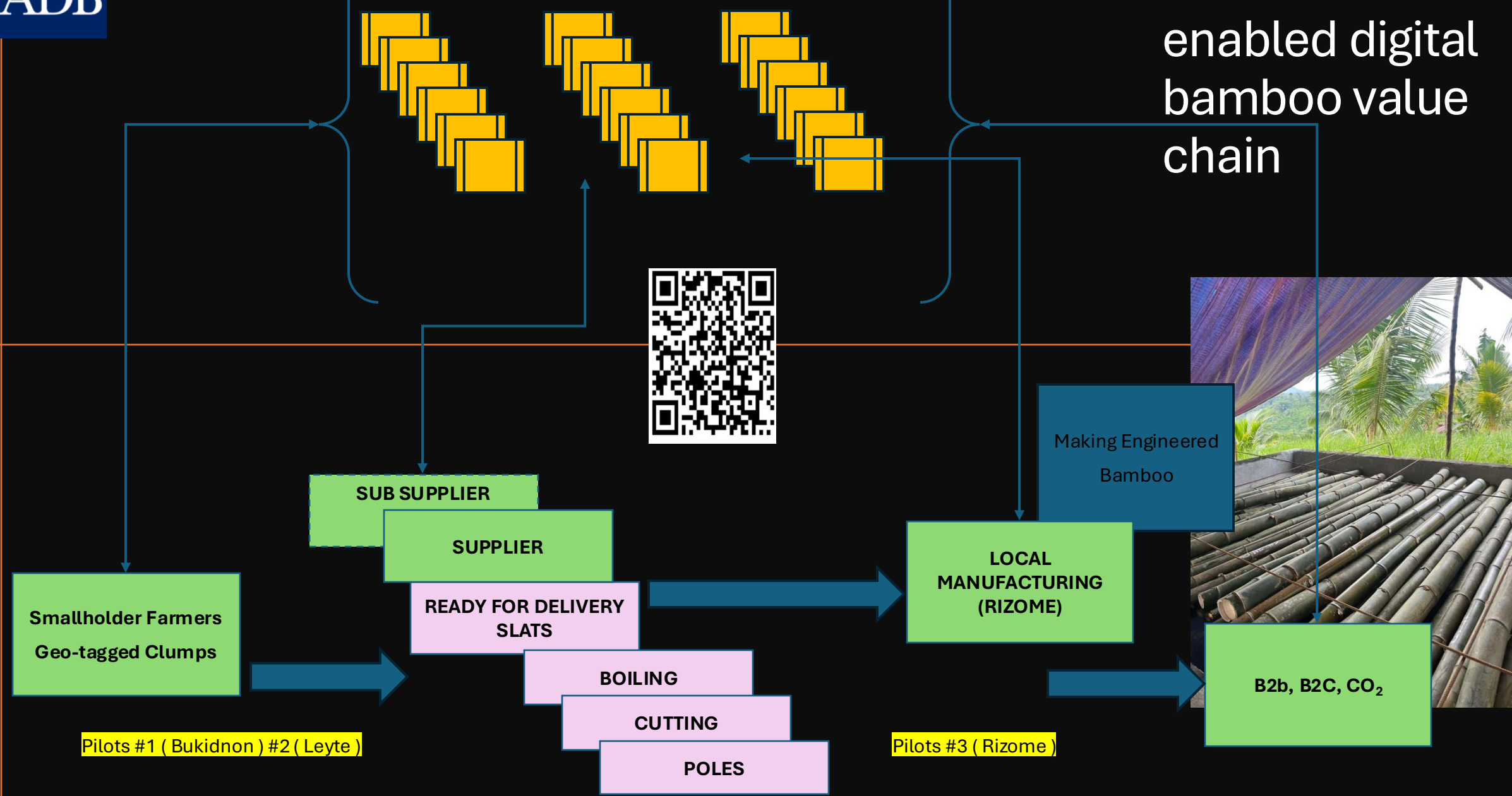
- Ability to ensure equitable data trace at all tiers of the value chain
- Data privacy & ownership
- Distributed ledger enables diversified market access as all stakeholders have equal transparency / traceability
- Auditable & tokenized supply chain data unlocks supply chain financing
- First-mile (especially smallholder farmers) digitalization without the need of smartphones → proof of location, harvest, price can be delivered via sms / USSD codes while maintaining blockchain proof
- Scales much faster (and more secure) than traditional database systems
- Integrates with mobile money: G-Cash; M-Pesa; PayTM etc.

Non digitized current state of bamboo supply chain



Blockchain supply chain track and trace --- dMRV

Blockchain enabled digital bamboo value chain



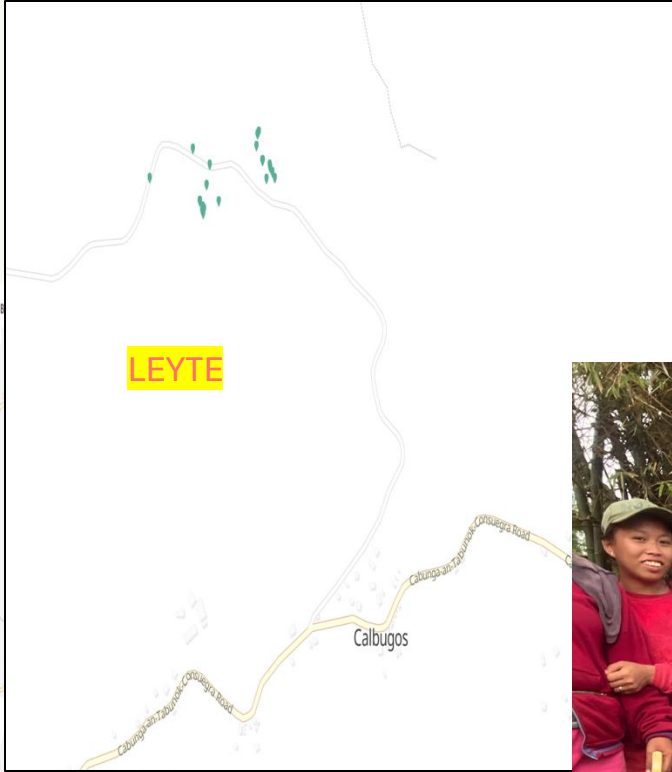
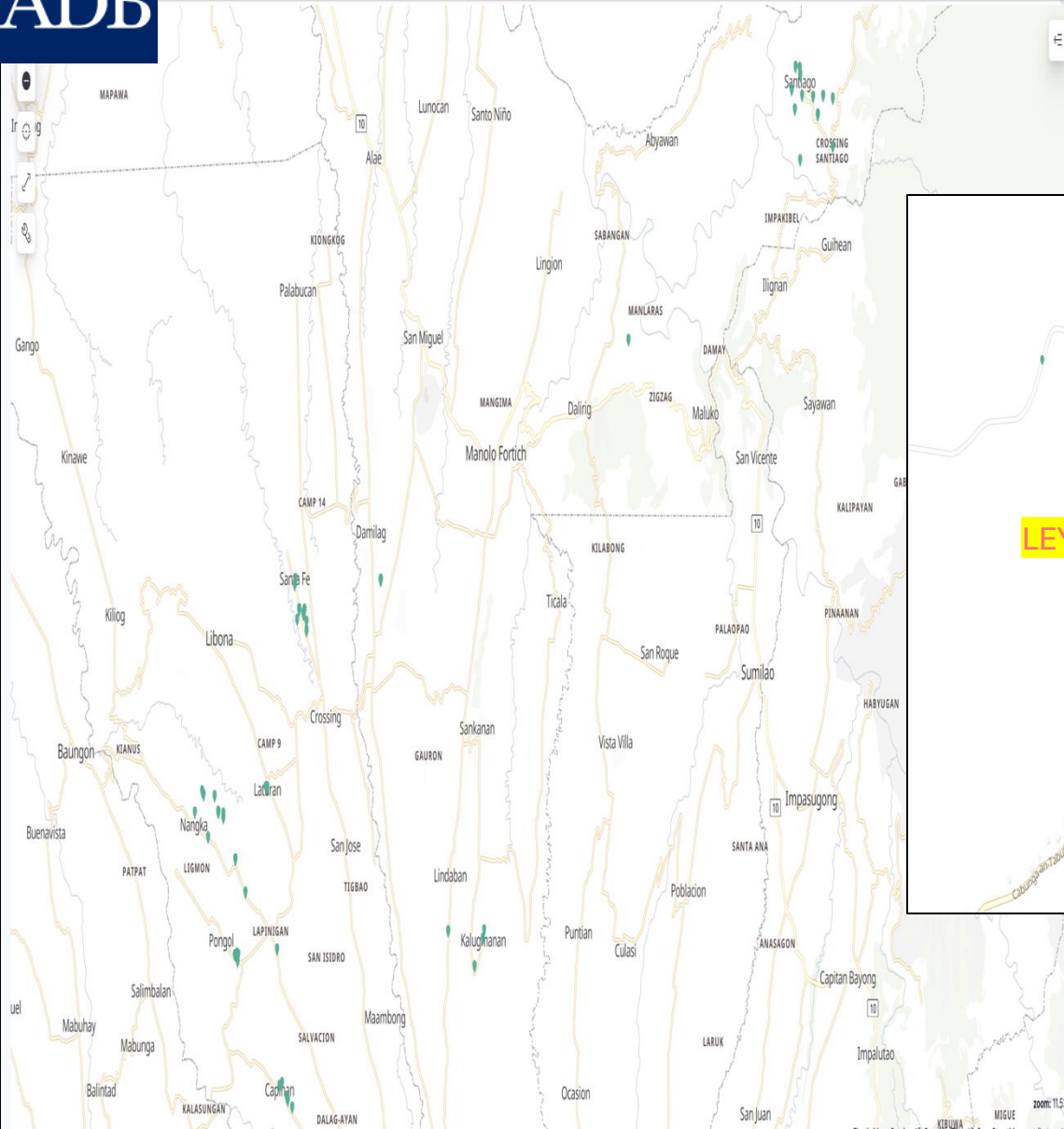


Bukidnon	<input type="radio"/>
Bamboo furniture /Factory	<input type="radio"/>
Rizome CDO Intake factory	<input type="radio"/>
Supplier - Arbusto Farms	<input type="radio"/>
Supplier - Jean Habulan	<input type="radio"/>
Supplier - Libona Pangkabuhayan Sakawayan	<input type="radio"/>
Supplier - Mariano Malones	<input type="radio"/>
Supplier - Mark Sebastian	<input type="radio"/>
Supplier - Pezhman Sofian	<input type="radio"/>
Supplier - Regie Mosqueda	<input type="radio"/>
Supplier - Sandivfa Association	<input type="radio"/>
Supplier - Taruc Jose	<input type="radio"/>
LEYTE	<input type="radio"/>
3D LEG Office	<input type="radio"/>
USWAG Artesano producers Cooperative	<input type="radio"/>
Cagnocot Crop Producers Association, Inc. (CCPAI)	<input type="radio"/>
Calbugos Lligay Farmers Association (CALIFA)	<input type="radio"/>
Samahan NG Munting (Samumaca)	<input type="radio"/>
Rizome CDO Intake factory	<input type="radio"/>

Rizome (Ready for Shipment)	<input type="radio"/>
Finished Product	<input type="radio"/>
Semi - Finished	<input type="radio"/>
Sanded	<input type="radio"/>
Laminated	<input type="radio"/>
Finished Slat	<input type="radio"/>
Dry Planed	<input type="radio"/>
Dried	<input type="radio"/>
Pressure Treated	<input type="radio"/>
Steamed	<input type="radio"/>
Wet Planed	<input type="radio"/>
Rizome CDO Intake factory	<input type="radio"/>

3 distinct pilots in one
integrated digital ecosystem





Almost 275
bamboo clumps
geotagged in 4
days

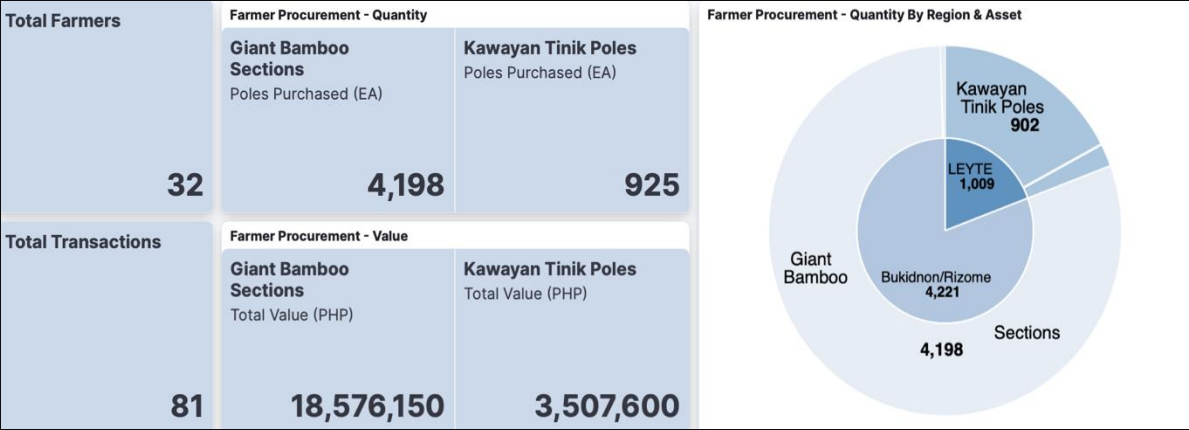


✓	Steamed (12)	550	Each	Wet Planed
✓	Wet Planed (11)	550	Each	Wet Planed
✓	Wet Planed (10)	550	Each	Wet Planed
✓	Wet Planed (9)	568	Each	Giant Bamboo Slat
✓	Rizome CDO Intake factory (8)	568	Each	Giant Bamboo Slat
✓	Supplier - Taruc Jose (3)	168	Each	Giant Bamboo Slat
✓	Supplier - Taruc Jose (2)	168	Each	Giant Bamboo Slat
✓	Supplier - Taruc Jose (1)	21	Each	Giant Bamboo Sect
	Rev Taruc	21	Each	Giant Bamboo Sect
✓	Supplier - Moncado Heleborn (3)	400	Each	Giant Bamboo Slat
✓	Supplier - Sandirfa Association (3)	400	Each	Giant Bamboo Slat
✓	Supplier - Sandirfa Association	50	Each	Giant Bamboo Sect
	RECHEL GUINONTAO	50	Each	Giant Bamboo Sect

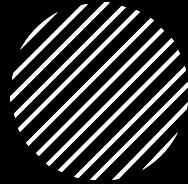
550	Each	Pressure Treated
550	Each	Pressure Treated
550	Each	Pressure Treated
550	Each	Steamed
550	Each	Steamed
550	Each	Steamed
550	Each	Wet Planed
550	Each	Wet Planed
550	Each	Wet Planed
568	Each	Giant Bamboo Slats
568	Each	Giant Bamboo Slats
168	Each	Giant Bamboo Slats
168	Each	Giant Bamboo Slats
21	Each	Giant Bamboo Sectors
21	Each	Giant Bamboo Sectors
400	Each	Giant Bamboo Slats
400	Each	Giant Bamboo Slats
400	Each	Giant Bamboo Sectors
50	Each	Giant Bamboo Sectors

With end-to-end track & trace

Digital MRV



Key observations



- Systems / DLT
 - Blockchain application works across all tiers
 - While internet access & connectivity can be a challenge, they don't impede the ability to register farms/farmers, geotag bamboo clumps
 - We found suppliers (aggregating the bamboo and making slats) have connectivity and they had no issues doing buy and batch transactions on the platform real-time.
- Business processes
 - Business processes are well defined, and roles / responsibilities are well established
 - The missing link seems to be digitization / automation
- Farm / farmer / supplier / financing
 - Smallholder farmer supply chains are informal
 - Farmers are not aware of the value of their bamboo plantations
 - Suppliers are informal
 - Quality of bamboo slats can be challenge due to equipment and cost of fuel / electricity
 - Lack of capital to sustain operations/delivery on a regular basis
- Off taker / market
 - Lack of multiple commercial off takers / lack of demand
 - Lack of source to finished product forecasting
 - Quality of raw materials
 - Price and payment terms
- Overall industry economics
 - There is not enough data yet to prove if bamboo cultivation is profitable for farmers
 - Philippines Carbon Credits have yet to gain global credibility

Lessons learned

- Bamboo farmers **definitely** need to be organized so they have a singular voice across all regions, varieties and applications
- Bamboo value chains, especially with smallholder farmers, can be digitized, and supply chain traceability can be established in remote and no connectivity areas of Bukidnon and Leyte
- Geo tagging a single clump of giant bamboo or Kawayan Tinik bamboo (or other varieties) is very doable and scalable
- User adoption is not a barrier given the local community engagement – in both Bukidnon and Leyte we found strong women-led supplier champions
- Off taker demand and options are limited but increasing which is critical for the industry
- **Major untapped opportunities for the entire Philippines bamboo industry at 3 levels:**
 - Increasing smallholder livelihood / income (including indigenous communities)
 - Boost the success and visibility of great companies like Rizome
 - Monetize the carbon credit opportunity for all stakeholders including the farmers
- **Opportunity to invest in bamboo agroforestry and supporting infrastructure:**
 - Production and manufacturing
 - Supplier (transforming poles to slats)
 - Farmer level – training and market access





Blockchain does not solve all challenges

Non-tech challenges / opportunities

- Smallholder farmers need to be organized and collective
- Farmer level training about bamboo related agronomy and income
- Standardization of Carbon Credits – in a way that is relevant to all stakeholders especially smallholder farmers
- Establish a regional or national baseline on price of bamboo poles (based on variety)
- Market linkages to commercial enterprises that trade in engineered bamboo, bamboo products and/or carbon offsets



Way forward recommendations

GOING BEYOND THE PILOTS:

- Tackle each of these 4 areas that make up the bamboo ecosystem in Philippines
 - **SOURCING**
 - Farmers are really empowered and make bamboo profitable for smallholders
 - Include side crops – coffee, cocoa, cassava
 - Carbon credit auditability and monetization
 - **PROCESSING**
 - Reliable machines for slat making in the field
 - Better pricing, forecasting
 - Training of suppliers to increase quality
 - **MANUFACTURING**
 - Increase market access by incentivizing new off takers / manufacturers
 - Increase farm to product quality in a way that reduces rejection rates for farmers
 - Explore byproducts – especially alternative fuels
 - Better pricing, forecasting
 - **ECONOMICS**
 - Supply / Demand synchronization
 - B2B2C
 - Global carbon market credibility
- Bring other actors into the ecosystem:
 - Energy companies
 - Travel & tourism companies to be end users
 - Foundations and philanthropic organizations
 - Micro-finance agencies
 - Development finance institutions